2-WIRE PRIVATE LINE AUTOMATIC RINGDOWN (2WPLAR) CHANNEL UNIT, 628295

GENERAL DESCRIPTION

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1. GENERAL

1.01 This Section provides a general description of the ITT D448 2-wire private line automatic ringdown (2WPLAR) channel unit, 628295 (Fig. 1), to the functional block diagram level.

1.02 Whenever this Section is reissued, the reasons for reissue will be listed in this paragraph.

1.03 The unit provides a voice frequency (VF) and signaling interface between the D448 multiplex terminal common equipment and a private line. In the transmit direction, the unit converts VF and signaling information into pulse code modulation (PCM) for application to the common equipment. In the receive direction, the unit decodes received PCM into VF and signaling information for application to a private line. During system outages, the unit provides various disconnect/make-busy routines for the trunk. The unit provides the originating end of a 900-ohm, 2-wire, 2-way automatic ringdown circuit meeting toll-connecting or intertoll transmission objectives.

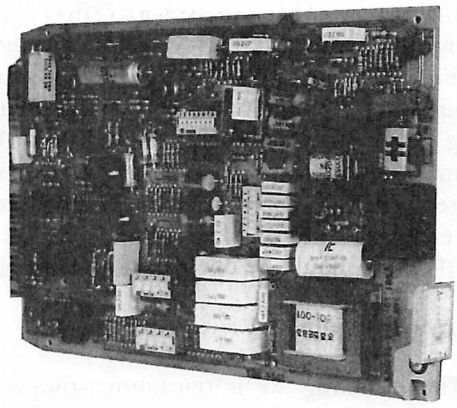


Fig. 1—2WPLAR Channel Unit, 628295

2. DESCRIPTION

2.01 The unit mounts in the D448 multiplex shelf (channel unit mounting section) in connectors J1A through J24A (for Digroup A) or connectors J1B through J24B (for Digroup B). Installation procedures for the unit are provided in Section ITTR-18-441.

2.02 The unit is available in Group -0 only.

2.03 The unit consists of an epoxy-glass printed circuit board (PCB) and associated circuit components. The lower front edge of the PCB is fitted with a handle to facilitate insertion and removal of the unit from the shelf. An identification strip on the handle face indicates the unit mnemonic (2WPLAR), last three digits of the model number, last three digits of the part number, and issue letter. The part number and issue letter are also located on the component side of the PCB.

2.04 The LC LED (DS1), the BSY switch (S5), and the splitting card jack (J1) are located on the front edge of the PCB.

2.05 Printed circuit wiring is etched on both sides of the PCB. The unit inputs and outputs are terminated in gold-plated contacts on the rear edge of the PCB. These contacts mate with a 60 pin contact edge connector on the rear of the multiplex shelf.

3. FUNCTIONAL OPERATION (FIG. 2)

HYBRID

3.01 The hybrid is toll-grade and provides 28-dB (minimum) echo return loss and a 20-dB (minimum) singing return loss. Either the internal compromise network (by selecting DIP switch option [CN]) or an external precision balance network (PBN) may be used to balance the hybrid. Regardless of whether the internal compromise network or an external PBN is used, additional build-out capacitance may be paralleled across it by selecting DIP switch options [2] through [64]. Build-out capacitance from 0.002 to 0.126 uF in 0.002-uF steps may be selected. The NT and NR leads are brought out for connection to an external PBN. If an external PBN is used, the [CN] DIP switch should be opened (not selected).

TRANSMIT VF CIRCUIT

3.02 The incoming VF is transformer-coupled to the low-pass/high-pass filter where it is amplified and filtered. The gain applied to the input signal can be varied over a 15-dB range to compensate for VF input levels from +6.0 to −9.0 dBm (in 1-dB steps) by the selection of transmit (TX) prescription level DIP switch options [+1], [+2], [+4], and [+8]. The resulting signal is passed to the TX office wiring loss (OWL) compensation circuit. The TX prescription OWL options provide 0 to 1.5 dB of gain in 0.1-dB steps to the signal applied to the encoder to compensate for office wiring/cabling losses. The resultant range for input levels is +6.0 to −10.5 dBm in 0.1-dB steps.

3.03 The encoder converts the VF signal and signaling information (Para. 3.06 through 3.11) to an 8-bit PCM word. When the TX AND gate is activated by the transmit logic unit (TLU) on the TCS4-X and TCS6-X leads, the 8-bit word is applied to the TLU via the TCD bus. The data is clocked out of the unit under control of the 1.536-MHz clock from the TLU.

RECEIVE VF CIRCUIT

3.04 An 8-bit PCM word from the receive logic unit (RLU) is applied to the decoder on the RCD bus. The decoder will only accept the data when the receive (RX) AND gate is activated by the RLU on the RCS4-X and RCS6-X leads. The decoder converts the PCM word into a VF signal and signaling information (Para. 3.06 through 3.11).

3.05 The VF signal is applied to the low-pass filter and passed through to the RX OWL compensation circuit. The RX prescription OWL options provide 0 to 1.5 dB of gain in 0.1-dB steps to the signal out of the low-pass filter to compensate for office wiring/cabling losses. The output of this circuit is further amplified. This amplification can be varied over a 15-dB range (in 1-dB increments) by the selection of RX prescription VF level DIP switch options [−1] through [−8]. This provides output levels of +6.0 to −9.0 dBm in 0.1-dB increments with both the OWL and prescription VF level options. The amplified VF is transformer-coupled to the C.O. equipment.

SIGNALING

3.06 When the near-end drop goes off-hook, the near-end 2WPLAR connects a ringing generator to the far-end 2WPLAR. Both the ringing generator signaling and the ring-back tone are interrupted in a 2-second on/4-second off cycle. The ringing continues until either the far end goes off-hook or the near end goes back on-hook. After the VF path has been established (both ends off-hook), either end can go back on-hook in any sequence without ringing occurring again.

3.07 In the idle (on-hook) condition, the on-hook condition is transferred to the far-end channel unit. At the far-end channel unit, the presence of pulses is decoded.

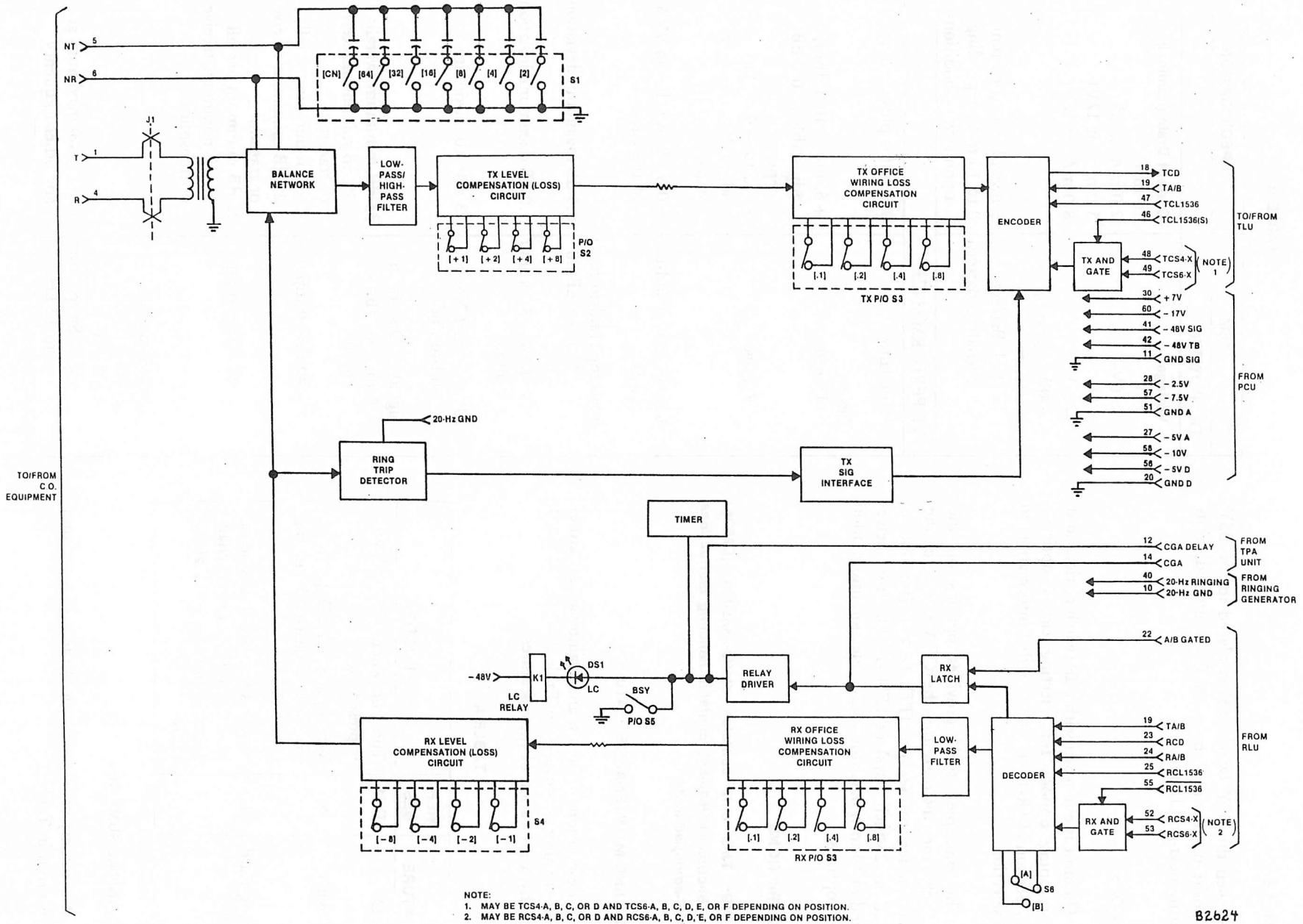
3.08 When the near end goes off-hook, LC relay K1 is energized. With K1 energized, the off-hook condition is transferred to the far-end channel unit. Also, when K1 is energized, the LC LED turns on.

3.09 When the called party (far end) goes off-hook during a ringing burst, the low-impedance path created by the off-hook telephone set applies the superimposed ringing potential back to the tip side of the line. Between ringing bursts, the called party going off-hook provides a loop for relay K1.

3.10 After the VF path is complete and the near-end loop goes back on-hook, K1 deenergizes. With K1 deenergized, the on-hook condition is transferred to the far-end unit.

CARRIER GROUP ALARM

3.11 During a CGA, a ground on the CGA lead forces relay K1 to release and remove the ringing voltage from the drop.



NOTE:
1. MAY BE TCS4-A, B, C, OR D AND TCS6-A, B, C, D, E, OR F DEPENDING ON POSITION.
2. MAY BE RCS4-A, B, C, OR D AND RCS6-A, B, C, D, E, OR F DEPENDING ON POSITION.

Fig. 2—2WPLAR Channel Unit, 628295, Functional Block Diagram

BUSY MODE

3.12 When the BSY switch (S5) is placed in the BSY position, the unit provides CGA ground, thus preventing near-end ringing.

4. OPTIONS

4.01 The unit is equipped with DIP switch options and strapping options for selecting circuit options. Refer to Section ITTR-18-441 for detailed information on option selection.

4.02 The multiplex shelf provides options on the backplane which control the CGA timing of the terminal. Refer to Section ITTR-18-405 (for shelves mounted in 23-inch bays) or ITTR-18-406 (for shelves mounted in 19-inch bays) for option selection information on these options.

5. RESTRICTIONS

WARNING: This unit contains static-sensitive (CMOS) devices. Section ITTR-18-599 contains handling instructions for CMOS-equipped units.

6. TEST AND MAINTENANCE FEATURES

6.01 A description of the test and maintenance features of the unit is provided in Table A. Refer to Fig. 1 for the physical location of these features.

TABLE A

FEATURE	REF. DES.	FUNCTION
LC LED	DS1	Turns on when a loop closure is present at the 2-wire drop.
BSY Switch	S5	When placed in BSY position, prevents a near-end ringing condition.
Splitting Card Jack	J1	Provides test/break jack access to C.O. equipment and channel unit drop sides of T and R leads.

7. TECHNICAL SUMMARY

7.01 A summary of technical specifications for the unit is given in Table B.

TABLE B

ITEM	SPECIFICATION
DC POWER	
Voltage	**Current Drain (nominal)**
− 5V	26 mA
− 10V	2.0 mA (at 5V)
+ 7V	5.0 mA (at 12V)
− 17V	8.0 mA (at 12V)
− 48V Signaling Battery	
Talk Battery	3 mA plus loop current
Signaling Battery	0 to 16 mA, depending upon signal conditions
VF PERFORMANCE	
Impedance	900 ohms plus 2.16 uF
Levels	
Transmit	+ 6.0 to − 10.5 dBm, adjustable in 0.1-dB steps
Receive	+ 6.0 to − 9.0 dBm, adjustable in 0.1-dB steps
Loss Stability (End-to-End)	± 0.5 dB over life in 95% of the circuits
Tracking (End-to-End)	
− 37 to + 3 dBm0 Input	0.5 dB maximum deviation
− 50 to − 37 dBm0 Input	1.0 dB maximum deviation
Idle Channel Noise (End-to-End)	23 dBrnc0 maximum
Signal-to-Distortion	
0 to − 30 dBm0 Input	33 dB minimum overall; 35 dB minimum receive or transmit
− 40 dBm0 Input	27 dB minimum overall; 29 dB minimum receive or transmit
− 45 dBm0 Input	22 dB minimum overall; 25 dB minimum receive or transmit
Single Frequency Distortion (at 0 dBm0)	
Input Swept from 0 to 12 kHz	− 28 dBm0 maximum at any other frequency

TABLE B (CONT)

ITEM	SPECIFICATION
Input between 1004 and 1020 Hz	– 40 dBm0 or less at any other frequency of 0 to 4 kHz with a distortion contribution objective from either transmit or receive of typically 6 dB better
Transhybrid Loss	
200 to 500 Hz	20 dB
500 to 1000 Hz	30 dB
1000 to 2500 Hz	35 dB
2500 to 3400 Hz	30 dB
Echo Return Loss (Measured against nominal impedance with 25 ohms in series with channel unit and no far-end channel unit)	28 dB minimum
Singing Return Loss (Measured against nominal impedance with 25 ohms in series with channel unit and no far-end channel unit)	20 dB minimum
Frequency Response (Referenced to 1020 Hz, End-to-End)	
60 Hz	20.0 dB minimum loss
200 Hz	0 to – 5.0 dB
300 to 3000 Hz	+ 0.5 to – 1.0 dB
3200 Hz	+ 0.4 to – 1.5 dB
3400 Hz	0 to – 3.0 dB
Balance Network	Compromise network of 900 ohms + 2.16 uF built-in and with BOC in 0.002-uF steps to 0.126 uF (NT and NR brought out for connection to external precision balance network)
Delay Distortion (End-to-End)	94 PAR (minimum)
Longitudinal Balance (AT&T Method)	
200 Hz	66 dB minimum
1000 Hz	60 dB minimum
3000 Hz	58 dB minimum

TABLE B (CONT)

ITEM	SPECIFICATION
Longitudinal Balance (IEEE Method)	
200 Hz	60 dB minimum
1000 Hz	60 dB minimum
3000 Hz	60 dB minimum
SIGNALING	
Pulse Speed	8 to 12 pps
Duty Cycle	30 to 75% break
Delay (0-Ohm Loop)	11 to 18 ms
Pulse Distortion	12 pps
Ring Burst	2s on/4s off, nominal
Ringing Tone Frequency	440 ± 2 Hz; 480 ± 2 Hz
Ringing Tone Level	– 27 to – 11 dBm0
OPERATING ENVIRONMENT	
Temperature	0 to + 55°C
Humidity	To 95% at 40°C (no condensation)
Altitude	To 14,000 ft (4,300 m)
DIMENSIONS	
Width	0.8 in. (1.9 cm)
Height	5.9 in. (15.0 cm)
Depth	9.7 in. (24.6 cm)
WEIGHT	1.1 lb (0.5 kg)

8. REPLACEABLE PARTS

8.01 This unit has no field-replaceable parts.

9. REFERENCES

9.01 The engineering drawings noted in Table C were used in the preparation of this Section.

TABLE C

TYPE	DRAWING NO.
Assembly	628295-000
Schematic	628295-002

9.02 Related information on the unit may be found in the ITTR Sections referenced in Table D.

TABLE D

TITLE	SECTION NO.
Connectorized Multiplex Shelf (MS/WC7, MS/WC5, MS/C7 and MS/C6), 628001, 628005, 628011 and 628015 (For 23-Inch Bays) — Option Selection, Installation and Pretest	ITTR-18-405
Connectorized Multiplex Shelf (MS19/WC7, MS19/WC5, MS19/C7 and MS19/C6), 628003, 628008, 628013 and 628018 (For 19-Inch Bays) — Option Selection, Installation and Pretest	ITTR-18-406
Special Service Channel Units — Option Selection and Installation	ITTR-18-441